

afterwards Koch confirmed the principal observations which had been made.

If we can exterminate the malaria-bearing species of mosquito in a locality, we may expect to prevent the propagation of the parasites there; I trust, therefore, that these investigations will not remain without practical results.

It may be useful to add a note regarding the somewhat confused matter of the classification and nomenclature of the various species. I divide those of men and birds into two genera, named as follows:—

Family: HÆMAMOEIDÆ, Wasielewski.

Genus I. *Haemamoeba*, Grassi and Feletti. *The mature gametocytes are similar in form to the mature sporocytes before the spores have been differentiated.*

Species I: *Haemamoeba Danilewskii*, Grassi and Feletti. Syn.: *Laverania Danilewskii*, Grassi and Feletti, in part; *Halteridium Danilewskii*, Labbé; &c. Several varieties—possibly distinct species. Parasite of pigeons, jays, crows, &c.

Species 2: *Haemamoeba relicta*, Grassi and Feletti. Syn.: *Haemamoeba relicta* + *H. subpræcox* + *H. subimmaculata*, Grassi and Feletti; *Proteosoma Grassii*, Labbé; &c. Parasite of sparrows, larks, &c.

Species 3: *Haemamoeba malariae*, Grassi and Feletti. Syn.: *Haemamoeba Laverani*, Labbé, in part. Parasite of quartan fever of man.

Species 4: *Haemamoeba vivax*, Grassi and Feletti. Syn.: *Haemamoeba Laverani*, Labbé, in part. Parasite of tertian fever of man.

Genus II: *Haemomenas*, gen. nov. Syn.: *Laverania*, in part + *Haemamoeba*, in part, Grassi and Feletti. *The gametocytes have a special crescentic form.*

Species: *Haemomenas præcox*, Grassi and Feletti. Syn.: *Haemamoeba præcox* + *H. immaculata* + *Laverania malariae*, Grassi and Feletti; *Haemamoeba Laverani*, Labbé, in part; &c. Several varieties—possibly distinct species. Parasite of the irregular, remittent, pernicious or æstivo-autumnal fever of man.

The two species lately discovered by Dionisi in bats appear to belong, one to one genus, and the other to the other genus. Two species described in frogs do not contain pigment, and require further study. Grassi and Feletti's arrangement is very confused, chiefly on account of their combining *H. Danilewskii* with the crescentic gametocytes of *H. præcox* in a separate genus, *Laverania*. Labbé admits only one human species, and yet erects two genera for the avian species. The double spore-clusters of *H. Danilewskii*, on which he lays much stress, are not always found, and are at the best due, I think, merely to the presence of the nucleus compressing so large a parasite. There is little to justify generic differences between the four species of *Haemamoeba*. On the other hand, the last species given above is sharply divided from the rest.

The zygotes of three species have been found to develop in mosquitoes as follows:—

Haemamoeba relicta in *Culex pipiens*.

Haemamoeba vivax in *Anopheles claviger*.

Haemomenas præcox in two undetermined species of *Anopheles* in India, and in *Anopheles claviger* in Italy.

The development is the same in all, but slight differences in details have been noticed between *H. vivax* and *H. falcipara* in the mosquito.

The terminology employed above has been adopted in consultation with Prof. Herdman, F.R.S. Some of it has already been used in this connection by Mesnil, and by Grassi and Dionisi. Nuttall has recently given a very full account of the subject in the *Centralblatt für Bakteriologie*.

RONALD ROSS.

SCIENCE AND EDUCATION.

TWENTY years have passed since Huxley said, at the opening of Mason College, Birmingham: "How often have we not been told that the study of physical science is incompetent to confer culture; that it touches none of the higher problems of life; and what is worse, that the continual devotion to scientific studies tends to generate a narrow and bigoted belief in the applicability of scientific methods to the search after truth of all kinds? How frequently one has reason to observe that no reply to a troublesome argument tells so well as calling its author a 'mere scientific specialist.' And, I am afraid it is not permissible to speak of this form of opposition to scientific education in the past tense." . . .

The exact applicability of these words in this year of grace is as good an example of the slowness of progress as could be wished. It is still urged almost as persistently as ever, and with the weight of university authority, that the only avenue to culture is by way of classics and the humanities. Has nothing come of the example of men like Huxley, Darwin, and the host of other widely-read, and deeply-educated, students of nature who, having borne their testimony, have gone over to the great majority?

These thoughts follow naturally from recent events in connection with the discussions and suggestions anent the constitution of the proposed Board of Education. The retirement of Sir John Donnelly from the secretaryship of the Science and Art Department led to the appointment of Sir George Kekewich to the vacant position, and for the future he will rule educational affairs both at South Kensington and Whitehall. In addition, two principal assistant secretaries were appointed, one for each of the departments referred to. These arrangements have disturbed the minds of the champions of that ill-defined section of educational work known as secondary education. After due representations Sir John Gorst stated, in the House of Commons, in reply to a question of Prof. Jebb, that a third official will be later appointed as assistant secretary for secondary education. This decision resulted in a correspondence which has brought to mind Huxley's addresses on education.

When a distinguished scholar and, on most subjects, broad-minded thinker, as Sir William Anson is, expresses himself in words like the following, which are taken from a letter in the *Times* of July 27, some sort of protest seems absolutely necessary.

"The attitude of those who are interested in secondary education, properly so-called, as distinct from elementary education on the one hand and instruction in science and art or technical education on the other."

"Scientific teaching alone will not produce the educated man, and the scientific expert may not be the best judge of the value of literary and historical studies, or of the respective parts which science and the humanities should play, even in an education which is mainly scientific."

"It is very important if the educational forces are to be brought into line, if the youth of the country are not merely to acquire some useful knowledge, but to become educated men—that where secondary education is given at all it should be given well, and that wherever it is given some one should watch over its interests and see that in the competition of humane and technical studies a due proportion is observed."

A number of unjustifiable conclusions may be derived from this letter; and it is therefore worth while to deal with a few of the points in it.

In the first place, it is tacitly assumed that some kind of secondary education exists in which instruction neither in science nor in art is given. The synonymous use of technical education and instruction in science and art must be passed over, though it provides a suggestive

index to the views of persons who are ever ready to pass judgment upon the educating capabilities of science and art. A course of instruction which ignores science and gives the cold shoulder to art is in one sense "secondary," but in no respect can it be called education. "Secondary education, properly so called," cannot exist distinct from "instruction in science and art." In fact, it is a little difficult to imagine what meaning Sir William Anson is intending to express. It would seem that he wishes to draw a distinction between the education offered in institutions of the grammar school type and those in which the curricula are at present directly governed by the Department of Science and Art. But it is a noteworthy circumstance that quite a number of old grammar schools provide, side by side with their classical work, classes in science which are actually subsidised by the much maligned department at South Kensington. And what is even more strange, judged from the point of view of Sir William Anson's letter, quite a number of these old grammar schools are also what is technically called "organised schools of science," which being interpreted, means that their time tables are modelled upon the regulations laid down in the Science and Art Directory, since they must be approved by the Inspector of the Department.

But the inference of the second quotation is of a more perverted type. "Scientific teaching alone will not produce the educated man," &c. Here again, something different from what is actually said is meant. Of course, Sir William Anson would agree that no teaching which is not scientific will do much towards educating anybody. As he himself said in a debate in the House of Commons on June 26, teachers should be taught how to teach, that is, should have "scientific" teaching explained to them. What is doubtless meant in the *Times* letter is, that instruction in natural science alone will not produce the educated man.

With this statement every man of science will agree; but neither will instruction in any single branch of human knowledge by itself educate. It would be just about as wise to attempt to educate a boy without introducing him to the beauties of our own incomparable national literature or that of some other great country, as it would to attempt to make him a cultured man and at the same time keep him ignorant of his place in the scheme of the universe and of the grandeur and beauty of the laws which govern things material. Culture is not the narrow business which the products of an exclusively classical training would have the world believe. Those authorities who claim for themselves alone the positions of priests in the temple of culture, are anachronisms—they should have lived in the Middle Ages. No education is worthy of the name which fails to endow its possessor with a sufficient breadth of view to give him a charitable demeanour towards every department of mental activity, and most of all to that wonderful accumulation of scientific knowledge to which we owe all that is best in life at the end of the nineteenth century. The man of science is as devout an admirer of literature, whether classical or modern, as any man. He is as ready with a profound admiration for the unique creations of the highest art, whether pictorial, musical, dramatic or what not, as any man. But he does claim that his goddess, science, is as worthy of attention as any other, and he has a right to expect that the reverence which he willingly extends to other deities shall similarly be shown by those who approach his particular shrine.

"The scientific expert may not be the best judge of the value of literary and historical studies or of the respective parts which science and the humanities should play, even in an education which is mainly scientific." So writes Sir William Anson. Possibly not, is the natural answer. But it is just as true that the classical (or historical) expert may not be the best judge of the value

of scientific and artistic studies, or of the respective parts which the humanities and science should play, even in an education which is mainly classical. This is only a verbose way of saying that no individual can know everything. There is just as good reason, to say nothing stronger, for giving the control of the classical part of secondary education into the hands of a widely cultured and eminent man of science as there is for making a similarly great classical authority responsible for the government of the teaching of science or art. We surmise that no good will come of special pleading of this specious kind.

With the third quotation from Sir William Anson's letter given above there can be no disagreement if it is rightly understood. No man of science would imagine the youth of the country to be educated who had merely acquired some useful knowledge. We all want our secondary education to be given well. But let us look facts in the face. It is possible to spend twenty years in studying classics and to remain uneducated. We may become familiar with the histories of all the nations of the earth and be as far from culture as when we started the study. The secrets of nature may all have been laid bare before our understanding eyes, and yet we may still dwell with the Philistines. Let it be thoroughly understood that education and culture are greater than history, greater than classics, greater than science, but include them all, each in its proper place, and these narrow-minded bickerings as to the place of this or that subject of study will become things unknown.

One more reference to Huxley will define the scope of education from the point of view of a representative man of science. Speaking in 1868 to the working men of South London, Huxley defined the well-educated man: "That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order; ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of Nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of Nature or of art, to hate all vileness, and to respect others as himself."

THE UNIVERSITY OF LONDON.

THE supplementary vote of 65,000*l.* required in connection with the housing of the University of London in the Imperial Institute building at South Kensington was agreed to by the House of Commons on Monday.

A portion of the western end of the building is to be assigned to the Institute free of rent, and the eastern and central portion of the building will form the new home of the London University. The space which will be given to the University in the building will be far greater than was now enjoyed by that body. In consideration for the transfer of the lease to the Office of Works, the Government will provide funds sufficient to pay off the existing mortgage of 40,000*l.* and discharge the floating debt of 15,000*l.* In addition to the cost of structural alterations, estimated at 7000*l.*, the vote included 3000*l.* for the maintenance and repair of the buildings and for the purchase of the necessary furniture.

The Treasury Minute, dated July 13, containing particulars of the transfer, is reprinted below:—